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Mapping Dark Maritime Networks

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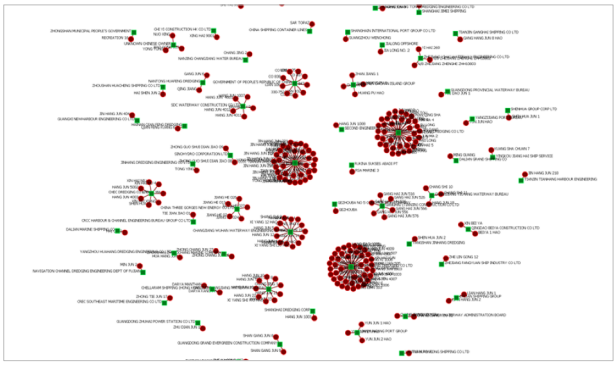
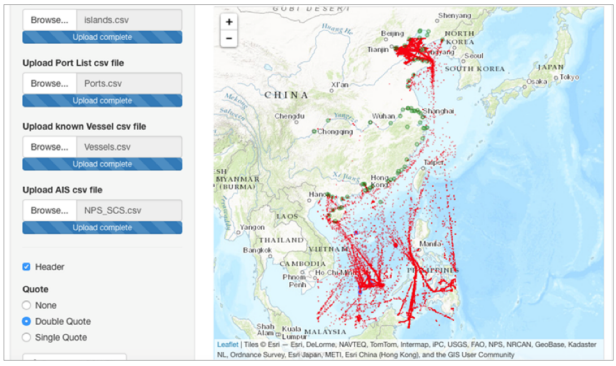
Research Questions

This research sought answers to the following the questions:

- A - Can social network analysis enhance maritime domain awareness and interdiction operations?
- B - What role do maritime dark networks play in supporting artificial reef construction in the South China Sea?
- C - Can existing analytic tools (e.g. ORA, UCINET for social network analysis; AIS and SEAVISION for geo-locating/tracking) be integrated for improved identification, geo-location, and tracking of maritime dark network platforms (military and commercial), associated owners/operators/State Owned Enterprises, commonly used ports, activities, and cargoes?
- D – Can technologies currently being pursued by SPAWAR, NRL, and ONI (e.g. ship recognition algorithms and sensors) be integrated as unstructured data into the social network matrices to enhance identification and tracking?
- E – Can this research be used to enhance maritime domain awareness in other areas of maritime dark network activities such as illicit trafficking, piracy, hybrid warfare, Illegal and Unregulated fishing?



Initial Depiction of Ships (red nodes) and Holding Companies (Green nodes)



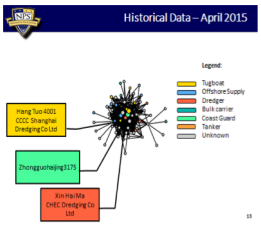
User-Filtered Ships, Ports, and Islands

Methodology

- Initial analysis focused on the analysis of two years of historic AIS tracks that spanned an eighteen month time period from November, 2014 through March, 2016 to determine co-location.
- Community detection and database algorithms were used to write R code and RShiny user interfaces to develop a graphic analytics tool capable of sorting and focusing on specific ships, operators, ports, and reefs of interest within selected timeframes.

Findings

- Using commercially available geospatial and temporal data, researchers were also able to develop a network of homeports for dredging and support vessels. This data enables more robust analysis within the maritime network.
- NPS researchers have identified 314 Chinese vessels that are assessed to have engaged in dredging, terra forma, or reef enhancement operations in the South China Sea. Principally, these vessels are involved in the construction of artificial land formations in the Spratly and Paracel Islands, Mischief, Subi, and Fiery Cross Reefs.
- We have concluded from the research we conducted and the tools we developed, that depictions of the maritime networks and chord diagrams of OPAREAS and ports visited associated with specific ships of interest could, with relative ease, be integrated into existing platforms such as SEAVISON.



Maritime Network Activity at Mischief Reef in April 2015

Recommendations

The outcomes from this analysis should offer not only the potential to predict future terra forma activity in the South China Sea but to leverage the information gathered on licit and illicit commercial shipping companies to facilitate enhanced money-tracking and better inform sanction regimes against the large, publicly-traded holding/operating companies whose assets are contributing to potential UN Convention on Law of the Seas violations.

Integrating depictions of the maritime networks and chord diagrams of OPAREAS and ports visited associated with specific ships of interest into existing platforms such as SEAVISON would significantly contribute to an awareness of specific ship affiliations and activities. Additionally, this information could contribute to predictive analysis to determine where impending reef enhancement activity may begin.

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